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ZBTAB: ZENITH-248 VERSION OF BLUGTAB

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The Naval Oceanographic Office has adapted the BLUGTAB program for interactive use on the Zenith-248 PC. An example of the program's usage and output is provided. Disagreement between the PC version and the UNIVAC version is less than .02 percent.

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EXECUTIVE SUMMARY

A version of BLUGTAB able to run interactively on a Zenith-248 PC is now operative. The program is called ZBTAB to indicate its relation to BLUGTAB and its ability to run on the Zenith computer. The main difference between ZBTAB and the UNIVAC counterpart is that the Z-248 version does not include the option to access databases.

The results of tests made on an Indian Ocean parameter set for three frequencies and a sample interactive session are included in this report. Comparison of numerical output from ZBTAB and the UNIVAC version of BLUGTAB shows less than 0.02% difference between bottom-loss values. Copies of the FORTRAN code and the executable file may be made from a master floppy maintained in the Charts and Publications Section.

INTRODUCTION

In response to the acoustic database requirement for Commander Naval Oceanography Command, the Naval Oceanographic Office has adapted the BOTLOSS (UNIVAC) version of the BLUGTAB program to run on the Z-248 PC.

The BLUGTAB program (Spofford et al., 1983) generates bottom-loss values versus grazing angle for up to six frequencies at a time. It allows both interactive input and input from various databases resident on the UNIVAC system. The PC version of the program does not have access to these databases and can only operate in an interactive input mode. This report documents the adaptation of BLUGTAB to the Z-248 PC system and presents the results of tests made to check the adapted program's output relative to BLUGTAB. The transported program is compatible with Microsoft FORTRAN version 3.2, and is compiled, linked, and executed within that system.

The use of ZBTAB for a specific area requires the user to have access to a Low Frequency Bottom Loss (LFBL) chart, the corresponding LFBL parameter table, a sediment-thickness chart, and bottom-water temperature data pertinent to that area. Such information is usually available in the Environmental Guides.

PROGRAM ADAPTATION

The essential procedure in adapting BLUGTAB to the PC system was one of excision. Those sections dealing with access of database information had to be removed from the executable code, leaving only the interactive input option available to the user.

Any reference to plotting routines or plot-oriented code was removed. The PC version does no direct plotting. If graphical results are needed, the output file (BLGTAB.OUT) can be read into the Harvard Graphics (or similar) plotting package.

All code related to identification of station location was also excised from the executable code. This information was mostly used for the purpose of retrieving data from the databases. The database information is not readily accessible to the PC user, and such code is therefore unnecessary. Security also dictates the separation of geographic information from data or model results when operating on a nonsecure PC.

Another problem in transporting the program to the PC was that routines INQYN and INSULT were not downloaded with the rest of the routines. This omission caused a failure in the MS-FORTRAN link process. The purpose of INQYN was to seek interactively a "yes" or "no" answer from the user. INSULT was called to inform the user that only a "yes" or "no" answer was an acceptable response. The call to INQYN was replaced by a formatted READ statement. The call to INSULT was dropped and replaced by a helpful message.

Input statements of the form READ (*,'(I1)'), although legal, had to be modified because in MS FORTRAN a [RETURN] response is not sufficient for completing numerical input. An example of this problem is the BLUGTAB code:

```
WRITE (*,*) ' IF ABOVE VALUE IS INCORRECT, ENTER 1. ELSE RETURN'
READ (*,'(I1)') IANSR
IF (IANSR .NE. 0) GO TO 25
```

The READ statement is not completed if the [RETURN] key is pressed using MS FORTRAN. The replacement code is of the form:

```
WRITE (*,*) ' IF ABOVE VALUE IS INCORRECT, ENTER 1. ELSE 0'
READ (*,*) IANSR
IF (IANSR .NE. 0) GO TO 25
```

TESTS OF PROGRAM

The sample ZBTAB interactive session in appendix A shows the queries and types of responses that comprise the session. Frequency information is entered first. Next, the bottom-loss model parameters are entered. The parameters are then echoed and are able to be edited if incorrect. The final input data for each model are the sediment thickness, the water depth, and the water-bottom sound speed. A query at the end of the data input phase allows the user to run another model without stopping the program.

Sample program output is shown in figure 1, where the abscissa represents grazing angles and the ordinate represents bottom-loss

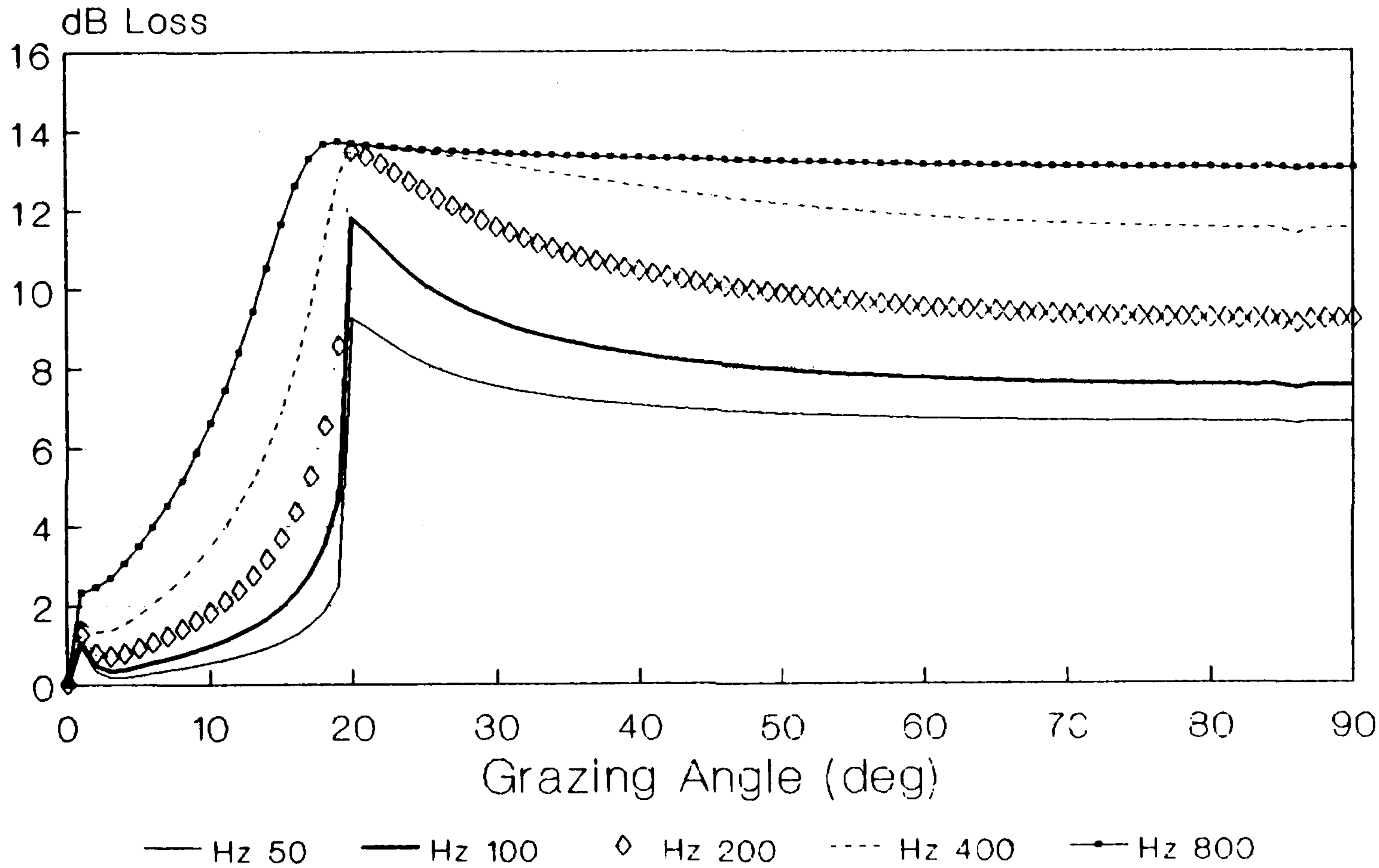

Figure 1. Bottom-loss vs. grazing-angle curves generated using ZBTAB program.

in decibels. Table 1 shows the parameters used to obtain the model results of figure 1. In table 1, the bottom-loss parameters were obtained by first identifying the desired LFBL region on an LFBL chart and then finding the parameter values for that region in the LFBL parameter table. The remaining parameters of table 1 were obtained from data plotted in the pertinent Environmental Guide.

A comparison of the numerical values of the output from the PC version of the program and from the interactively run UNIVAC version showed less than .02% maximum difference between the calculations. The greatest difference occurred at large grazing angles.

REFERENCE

Spofford, C.W., W.W. Renner, and H.J. Venne, 1983, Modifications to Fact and Astral for the Bottom-Loss Upgrade, SAI-84-148-WA.

TABLE 1

Parameters Used for ZBTAB Bottom-Loss Computations

Bottom-Loss Parameters
(from LFBL chart and LFBL parameter table)

Value	Parameter Description
0.997	V_s/V_o Ratio
0.04	Thin Layer Thickness
1.56	Thin Layer Density
1.56	Bulk Density
0.87	Velocity Gradient
-0.4	Velocity-Profile Curvature
0.01	Surficial Attenuation
1.0 E-04	Attenuation Gradient
0.5	Basement Reflection Coefficient

Other Input Parameters
(from Environmental Guide)

Value	Parameter Description
1100.0	Water Depth
0.3	Sediment Thickness (seconds)
1475	Water-Bottom Velocity

APPENDIX A
Sample ZBTAB Interactive Session

```
 ENTER THE NUMBER OF FREQUENCIES (<= 6)
3

  ENTER THE FREQUENCIES (LOWEST TO HIGHEST)
50. 100. 200.
 MINIMUM INPUT FREQUENCY =     50.0
 MAXIMUM INPUT FREQUENCY =    200.0


 ENTER THE CS/CO RATIO
1.01
 ENTER THE THIN LAYER THICKNESS (M)
 ENTER THE THIN LAYER DENSITY
3.
 ENTER THE SEDIMENT DENSITY
3.
 ENTER THE SEDIMENT SOUND SPEED GRADIENT
1.5
 ENTER THE PROFILE CURVATURE PARAMETER, BETA
15.
 ENTER THE ATTENUATION AT Z = 0
 ENTER THE ATTENUATION GRADIENT
4.e-05
 ENTER THE BASEMENT LOSS (DB OR COEFFICIENT)


 1) CS/CO RATIO =    1.01000
 2) THIN LAYER THICKNESS =     .04000 M
 3) THIN LAYER DENSITY =    3.00000
 4) SEDIMENT DENSITY =    3.00000
 5) SEDIMENT SOUND SPEED GRADIENT =    1.50000/SEC
 6) BETA,PROFILE CURVATURE =   15.00000
 7) ATTENUATION AT Z = 0 =   .0150000 DB/M/KHZ
 8) ATTENUATION GRADIENT =  .00004000 DB/M/M/KHZ
 9) BASEMENT LOSS =     .50000

 ENTER THE NUMBER OF CHANGES NEEDED (0 IF NONE)
0

 ENTER THE SEDIMENT THICKNESS (METERS OR 2 WAY TIME)
1.333
 INPUT SEDIMENT THICKNESS =          1.3330000
 IF INCORRECT ENTER 1, OTHERWISE ENTER 0
0

ENTER THE WATER DEPTH IN METERS:
```

```
4350.

ENTER THE BOTTOM WATER SOUND SPEED (m/s):
1530.5


 SEDIMENT THICKNESS =      1.33 SECONDS

 SEDIMENT THICKNESS =   1741.92 METERS

     .000        .000        .000        .000
   10.000       1.297       1.361       1.483
   20.000       1.351       1.707       2.360
   30.000       1.759       2.498       3.682
   40.000       2.885       4.232       5.459
   50.000       5.840       5.908       5.911
   60.000       5.756       5.921       5.935
   70.000       5.692       5.919       5.947
   80.000       5.656       5.914       5.953
   90.000       5.645       5.913       5.955

DO YOU WISH TO RUN ANOTHER MODEL? (Y/N)
N

  THE RESULTS ARE SAVED TO FILE BLGTAB.OUT.
```

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